



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/810,735

03/25/2004

Jick M. Yu

42P6934D

9698

8791

7590

06/11/2007

BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
1279 OAKMEAD PARKWAY  
SUNNYVALE, CA 94085-4040

EXAMINER

MAI, ANH D

ART UNIT

PAPER NUMBER

.2814

MAIL DATE

DELIVERY MODE

06/11/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/810,735	<b>Applicant(s)</b> YU, JICK M.	
	<b>Examiner</b> Anh D. Mai	<b>Art Unit</b> 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 55-64, 66, 67, 69-73, 75, 76 and 78-80 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 55-64, 66, 67, 69-73, 75, 76 and 78-80 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Status of the Claims*

1. Amendment filed March 23, 2007 is acknowledged. Claims 65 and 74 have been cancelled. Claims 55, 57, 67, 69, 76 and 78 have been amended. Claims 55-64, 66, 67, 69-73, 75, 76 and 78-80 are pending.

### *Specification*

2. The amendments to the specification is acknowledged.

### *Drawings*

3. The drawings were received on March 23, 2007. These drawings are acceptable.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims (all pending) 55-64, 66, 67, 69-73, 75, 76 and 78-80 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 55, line 10, recites: **wherein the wafer processing apparatus does not have a polishing chamber.**

Claim 67, line 11, recites: **wherein the wafer processing apparatus does not have a metal deposition chamber.**

However, the specification, page 8, lines 21-22, clearly discloses: "a wafer processing apparatus 200 includes a metal deposition tool and a CMP tool".

Art Unit: 2814

Page 9, lines 11-13, clearly discloses: “a wafer processing apparatus includes a metal deposition tool that is a chemical vapor deposition (CVD) tool 340. Also, apparatus 300 includes a CMP tool 320”.

Page 10, lines 1-2, clearly discloses: “a wafer processing apparatus 400 includes a metal deposition tool 460 and a CMP tool 420”.

Clearly, claims 55 and 67 are contradicting the disclosure. **Therefore, all pending claims are indefinite.**

The term “the wafer processing apparatus **does not have** a polishing chamber or **does not have** a metal deposition chamber” are negative limitation that rendered the claims indefinite because it was an attempt to claim the invention by excluding what the inventor *did not invent* rather than distinctly and particularly pointing out what they did invent. See *In re Schechter*, 205 F.2d 185, 98 USPQ 144 (CCPA 1953). (See MPEP 2173.05(i)). Any negative limitation or exclusionary proviso *must have* basis in the original disclosure. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977).

Therefore, by claimed negatively, without a positively disclosure, **all claims are indefinite.**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2814

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 55-63, 65, 67, 69-72, 74, 76 and 78-80 are rejected under 35 U.S.C. 102(e) as being anticipated by Henley et al. (U.S. Patent No. 6,207,005) of record.

With respect to claim 55, insofar as the apparatus is concerned and as best understood by the examiner, Henley teaches a wafer processing **apparatus** as claimed including:

a plurality of metal deposition chambers, the metal deposition chambers is capable of depositing metal layers on wafers; (col. 11, lines 20-29);

an annealing chambers (col. 10, line 65-col. 11, line 19), the annealing chamber integrated with the wafer processing apparatus (10, 200, 300), the annealing chamber is capable of anneal the metal layers to stabilize hardness of the metal layers prior to chemical mechanical polishing;

a robot (20) means for moving the wafers (col. 4, lines 18-21),  
wherein the wafer processing apparatus does not have a polishing chamber. (See Figs. 1-2).

Regarding the terms: “the metal deposition chambers to deposit metal layers on wafers”; “the annealing chambers to anneal the metal layers to stabilize hardness of the metal layers prior to chemical mechanical polishing” and “robot means for moving the wafers having the metal layers deposited thereon from the chemical vapor deposition chambers directly to the one or more annealing chambers shortly after the metal layers have been deposited on the wafers”, these

Art Unit: 2814

terms are considered to be **functionalities or utilities** of the components, i.e., the robot, of a cluster tool.

Note that the claim is directed to a **wafer processing apparatus** not that of method of making or depositing metal on a wafer.

Since the apparatus of Henley comprises all components (metal deposition chamber, annealing chamber and robot) as claimed, thus the apparatus of Henley is **fully capable** of performing the functions or utilities as claimed, thus, the limitations of the claim are met.

Regarding the capability of the robot 20, since all the chambers of the cluster tool (10, 200, 300) are directly connected to the central wafer transfer chamber, therefore, the robot 20 is fully capable of and configured to transferring a wafer **directly** from one chamber to the other, prior to or shortly after a process has been completed depend upon the application.

Regarding the wafer processing apparatus does not have a polishing chamber, Henley teaches: "the exact configuration of chambers used in the present cluster tool apparatus depends upon the application". (Col. 4, lines 35-37).

With respect to claim 56, the plurality of metal deposition chambers are CVD chambers.

With respect to claim 57, the wafer processing apparatus of Henley consists of CVD chambers, the annealing chamber and the robot.

Note that, although the cluster tool of Henley may be comprising more components than claimed, however, these components are independently functions and do not materially affect

Art Unit: 2814

the basic and novel characteristic(s) of the claimed invention. Therefore, the limitations of claim 57 are met.

With respect to claim 58, the annealing chambers of Henley is attached to the side of the wafer processing apparatus.

With respect to claim 59, the annealing chamber is provide adjacent the wafer processing apparatus and the CVD chambers.

With respect to claim 60, the CVD chamber of Henley includes a copper deposition chamber.

With respect to claims 61-63, the annealing chamber of Henley comprises a furnace, a heat lamp or a hot stage. (See col. 13, line 46-58).

With respect to claim 67, insofar as the apparatus is concerned and as best understood by the examiner, Henley teaches a wafer processing apparatus as claimed including:

an annealing chambers (col. 10, line 65-col. 11, line 19), the at least one annealing chambers integrated with the wafer processing apparatus (10, 200, 300), the annealing chamber is capable of anneal wafers having metal layers thereon to stabilize hardness of the metal layers prior to chemical mechanical polishing;

one or more chemical mechanical polishing (CMP) platforms (305), the one or more (CMP) platforms integrated with the wafer processing apparatus, the one or more CMP platforms is capable of polish the wafers including the metal layers;

a robot (20) means for moving the wafers. (See Figs. 1-3).

Regarding the terms: “the at least one annealing chambers *to anneal* wafer having metal layers thereon to stabilize hardness of the metal layers prior to chemical mechanical polishing”; “the one or more chemical mechanical polishing platforms *to polish* the wafers including the metal layers” and “robot means for moving the wafers having the metal layers deposited thereon from the at least one annealing chamber directly to the one or more chemical mechanical polishing platforms”, these terms are considered to be the **functionalities or utilities** of each components of a cluster tool.

Since the apparatus of Henley comprises all components (annealing chamber, CMP platform and robot) of the claim, thus the apparatus of Henley is fully capable of performing the functions or utilities as claimed, thus, the limitations of the claim are met.

Regarding the capability of the robot 20, since all the chambers of the cluster tool (10, 200, 300) are directly connected to the central wafer transfer chamber, therefore, the robot 20 is fully capable of and configured to transferring a wafer directly from one chamber to the other, prior to or shortly after a process has been completed depend upon the application.

Regarding the wafer processing apparatus does not have a metal deposition chamber, Henley teaches: “the exact configuration of chambers used in the present cluster tool apparatus depends upon the application”. (Col. 4, lines 35-37).

With respect to claim 69, as best understood by the examiner, the wafer processing apparatus of Henley consists of the annealing chamber, the one or more chemical mechanical polishing platforms, and the robot means.



Note that, although the cluster tool of Henley may be comprising more components than claimed, however, these components are independently functions and do not materially affect the basic and novel characteristic(s) of the claimed invention. Therefore, the limitations of claim 57 are met.

With respect to claim 70, the annealing chambers of Henley are attached to the side of the wafer processing apparatus.

With respect to claim 71, the annealing chambers of Henley is provided adjacent to the wafer processing apparatus and one or more CMP platforms.

With respect to claim 72, the annealing chamber of Henley comprises one or more selected from a furnace, a heat lamp and a hot stage. (See col. 13, line 46-58).

With respect to claim 76, insofar as the apparatus is concerned and as best understood by the examiner, Henley teaches a wafer processing apparatus as claimed including:

one or more chemical mechanical polishing (CMP) platforms (305), the one or more CMP platforms integrated with the wafer processing apparatus, the one or more CMP platforms is capable of polish wafers having metal layers thereon;

an annealing chambers (col. 10, line 65-col. 11, line 19), the one or more annealing chambers integrated with the wafer processing apparatus, the annealing chamber is capable of anneal the wafers having the metal layers thereon to stabilize hardness of the metal layers prior to or after the wafers have been polished;

a robot (20) means for moving the wafers. (See Figs. 1-3).

Art Unit: 2814

Regarding the terms: “the one or more chemical mechanical polishing platforms *to polish* the wafers having metal layers thereon”; “the one or more annealing chambers *to anneal* wafer having metal layers thereon to stabilize hardness of the metal layers after the wafers have been polished”; and “robot means for moving the wafers that have been polished from the one or more chemical mechanical polishing platforms directly to the one or more annealing chambers”, these terms are considered to be the functionalities or utilities of each components of the cluster tool.

Since the apparatus of Henley comprises all components (CMP platforms, annealing chamber and robot) of the claim, thus the apparatus of Henley is fully capable of performing the functions or utilities as claimed, thus, the limitations of the claim are met.

Regarding the capability of the robot 20, since all the chambers of the cluster tool (10, 200, 300) are directly connected to the central wafer transfer chamber, therefore, the robot 20 is fully capable of and configured to transferring a wafer directly from one chamber to the other, prior to or shortly after a process has been completed depend upon the application.

With respect to claim 78, as best understood by the examiner, the wafer processing apparatus of Henley consists of the annealing chambers, the one or more CMP platforms and the robot means.

Note that, although the cluster tool of Henley may be comprising more components than claimed, however, these components are independently functions and do not materially affect the basic and novel characteristic(s) of the claimed invention. Therefore, the limitations of claim 57 are met.

With respect to claim 79, the annealing chambers of Henley are attached to the side of the wafer processing apparatus.

With respect to claim 80, the annealing chambers of Henley are provided adjacent to the wafer processing apparatus and one or more CMP platforms.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 64, 66, 73 and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley '005.

With respect to claims 64 and 73, Henley teaches (col. 13, lines 58-64) that the annealing chamber can heat the wafer to a temperature of about 450 °C or greater.

Note that, the limitation of the claims are the annealing chamber is to heat to a temperature of about 200 °C.

The specification contains no disclosure of either the *critical nature of the claimed heat to a temperature of 200 °C* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Art Unit: 2814

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to was made to heat the wafer to the temperature (as claimed, 200 °C) depend upon the application since the annealing chamber of Henley is fully capable of heating to 450 °C or greater.

With respect to claim 66 and 75, Henley teaches the wafer processing apparatus as described in claims 56 and 67 above including a plurality of CVD chambers.

Thus, Henley is shown to teach all the features of the claim with the exception of explicitly disclosing a wafer processing apparatus comprises three CVD chambers.

However, Henley further teaches it is possible to use **any number of chambers** if desired. (See col. 5, 38-44).

The specification contains no disclosure of either the *critical nature of the claimed apparatus comprises three CVD chambers* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to include three CVD chamber in the wafer processing apparatus of Henley since Henley already recognize that any number of chambers can be used for the wafer processing apparatus. Furthermore, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v Bemis Co.*, 193 USPQ 8.

Response to Arguments

5. Applicant's arguments filed November 13, 2006 have been fully considered but they are not persuasive.

Rejection under 35 U.S.C. 102:

Applicant argues: Henley does not teach or suggest (1) a robot means for moving wafer having metal layers deposited thereon from metal deposition chambers directly to an annealing chamber shortly after the metal layers have been deposited on the wafers.

As apparent, the Applicant **argues about the process steps** while the **claim is directed to an apparatus**. From the argument, the only “means for” that the robot can performs is to move the wafer that has metal layers deposited thereon from the deposition chamber directly to the annealing chamber shortly after the metal layers have been deposited on the wafers. Other than that, the robot is ceased to function. However, this is not the case, since clearly robot of Henley is means for moving the wafer to and from any chambers. Therefore, the limitation of “robot means for moving the wafer” is met.

Regarding (2) wherein the wafer processing apparatus does not have a polishing chamber, this limitation clearly contradicting the specification. (See the rejection above).

Rejection under 35 U.S.C. 103:

Since the independent claims are anticipated by Henley, therefore, claims 64, 66, 73 and 75 are obvious over Henley as discussed above.

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

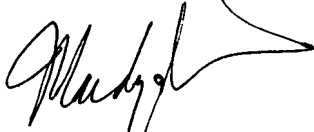
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 2814

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Anh D. Mai', with a long, sweeping horizontal stroke extending to the right.

**ANH D. MAI**  
**PRIMARY EXAMINER**